LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES SECTION

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

CHENIERE LAKE

WATERBODY EVALUATION &
RECOMMENDATIONS

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED ANNUALLY

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WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Sportfish species are managed to provide a sustainable population while providing anglers the opportunity to catch or harvest numbers of fish adequate to maintain angler interest and efforts. Bass (*Micropterus spp.*) anglers are afforded the opportunity to catch trophy fish through the introduction of Florida largemouth bass (*Micropterus floridanus*).

Commercial

The physical characteristics of Cheniere Lake do not support the large rough fish species that normally comprise a commercial fishery; therefore, a commercial fishery strategy is not used.

Species of Special Concern

No threatened or endangered fish species are found in this waterbody.

EXISTING HARVEST REGULATIONS

Recreational

Statewide regulations are in effect for all fish species. The 2013 recreational fishing regulations may be viewed at the link below:
http://www.wlf.louisiana.gov/fishing/regulations

Commercial

Statewide regulations are in effect for all species except for Parish regulations (see below).
The 2013 commercial fishing regulations may be viewed at the link below:
http://www.wlf.louisiana.gov/fishing/regulations

Parish Regulations

No commercial fishing May 15 – Sept. 14.
Gillnets: 3 inch min. square (knot to knot) during pool stage, 4 inch min. during drawdowns.

SPECIES EVALUATION

Recreational

Largemouth bass (*M. salmoides*) are targeted as a species indicative of the overall fish population due to their high position in the food chain. Electrofishing is the best indicator of largemouth bass abundance and size distribution, with the exception of large bass. Gill net sampling is normally used to determine the status of large bass and other large fish species, though it is not typically conducted in Cheniere Lake due to the dense standing timber and stumps. Shoreline seining is used to collect information related to forage availability and fish reproduction.

In the chart below (Figure 1), springtime electrofishing data is used as an indicator of largemouth bass relative abundance with total catch per unit effort (CPUE) indicated since

1992. Sampling is conducted in the spring and fall on a bi-annual basis. Trends in CPUE for all largemouth bass size groups were positive until 2009. An explanation for the recent decline is unknown, though electrofishing was conducted during the day in 2011, rather than at night, as all previous samples were conducted. It was decided to continue day sampling due to the numerous boating hazards in Cheniere Lake. It should also be noted that CPUE values generated by electrofishing are often lower in heavily forested, swamp-like waterbodies, such as Cheniere, than in typical reservoirs in Louisiana due to the lack of fish concentrations along the shoreline and/or difficulty of sampling shoreline habitat. Sampling, for the most part, has shown that Cheniere Lake bass are more abundant in all size groups subsequent to the series of 3 foot drawdowns that began in 1998.

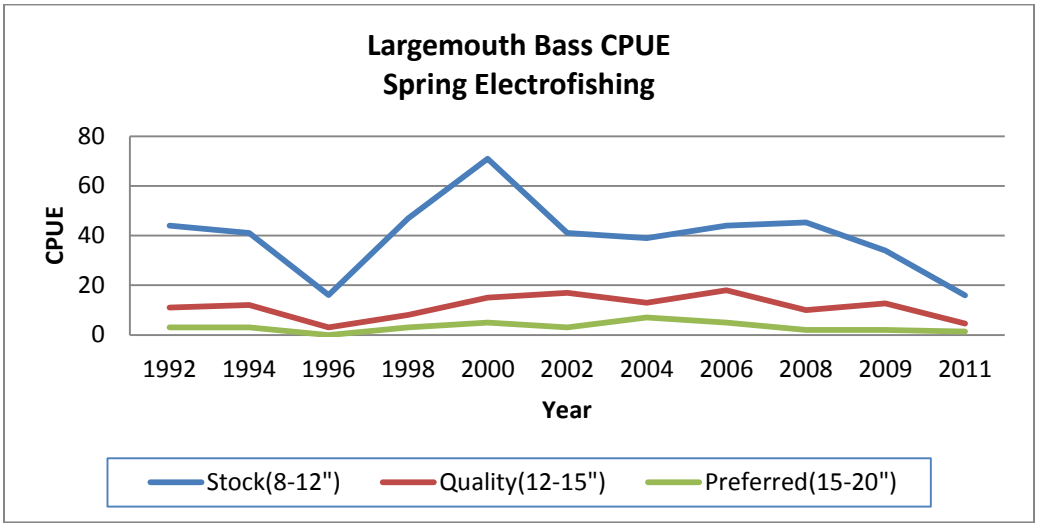


Figure 1. The CPUE of stock, quality, and preferred-size largemouth bass from spring electrofishing results on Cheniere Lake, LA, from 1992 – 2011.

Proportional stock density (PSD) and relative stock density (RSD) are indices used to numerically describe length-frequency (size distribution) results. Proportional stock density compares the number of fish of quality-size [greater than 12 inches total length (TL) for largemouth bass] to the number of bass of stock-size (8 inches or greater in TL ~~length~~). The PSD is expressed as a percent. A fish population with a high PSD consists mainly of larger individuals, whereas a population with a low PSD consists mainly of smaller fish. For example, the chart below (Figure 2) indicates a PSD of 29 for 2011. The number indicates that 29% of the bass stock (fish over 8 inches TL) in the sample was at least 12 inches or longer.

$$PSD = \frac{\text{Number of bass>12 inches}}{\text{Number of bass>8 inches}} \times 100$$

Relative stock density (RSD) is the proportion of largemouth bass in a stock (fish over 8 inches TL) that are of a specified size class. For example, RSD of "Preferred-size" (RSD_p) bass is calculated as follows:

$$\text{Number of bass>15 inches}$$

$$RSD_p = \frac{\text{Number of bass} > \text{preferred length}}{\text{Number of bass} > 8 \text{ inches}} \times 100$$

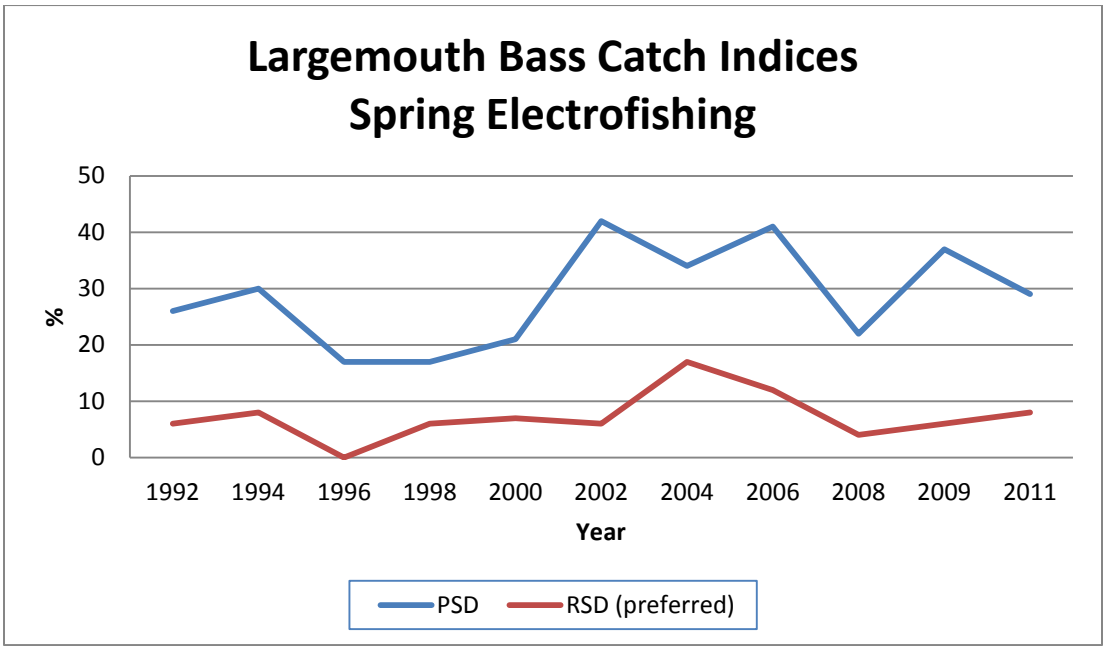


Figure 2. The size structure indices (PSD and RSD_p) for largemouth bass from spring electrofishing results on Cheniere Lake, LA from 1992 – 2011.

Trends in sampling results indicate an increasing percentage of the Cheniere Lake bass stock (fish over 8 inches TL) is over 12 inches TL and also over 15 inches TL. Fewer large bass were sampled from 2008 - 2011.

Forage

Sunfish, shad and silversides have been identified as primary forage species for largemouth bass in Cheniere Lake. Forage availability is measured through shoreline seine sampling and indirectly through measurement of largemouth bass body condition or relative weight. Relative weight (Wr) is the ratio of a fish's weight to the weight of a ''standard'' fish of the same length and is typically estimated from fish captured during fall electrofishing. The index is calculated by dividing the weight of a fish by the standard weight for its length, and multiplying the quotient by 100. Largemouth bass relative weights below 80 indicate a potential problem with forage availability. Relative weights for Cheniere Lake largemouth bass typically measure around 100 in all size groups indicating abundant forage species and a healthy bass population (Figure 3). Electrofishing was not conducted in fall, 2011.

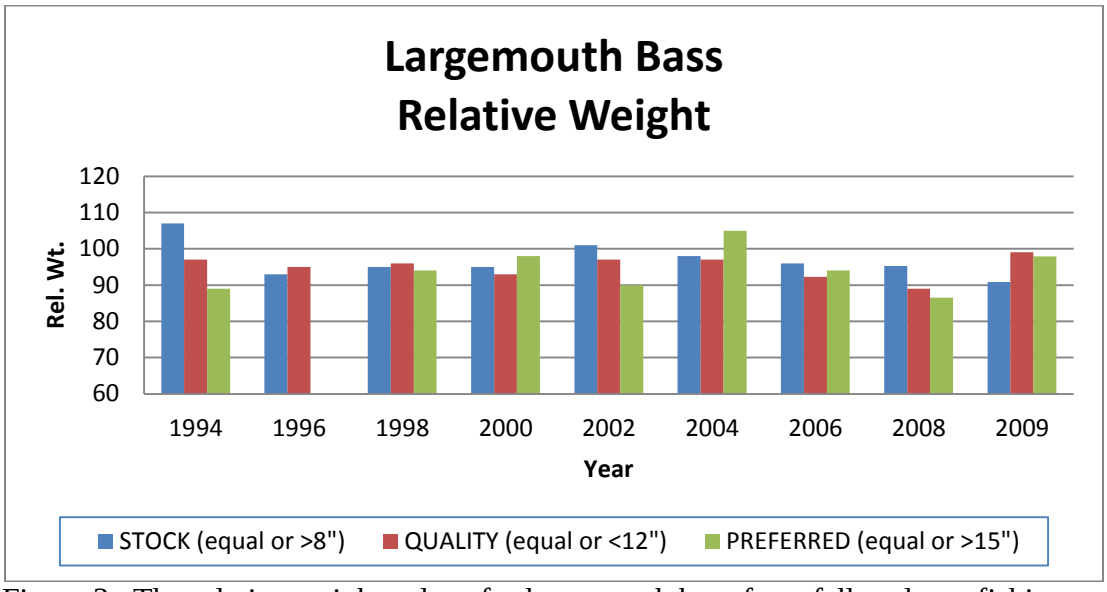


Figure 3. The relative weight values for largemouth bass from fall electrofishing results on Cheniere Lake, LA from 1994 – 2009.

Genetics

Florida bass have been stocked into Cheniere Lake to increase the potential for production of larger bass. Although stocking was initiated as early as 1985, sampling results indicate a low rate of incorporation into the native population. One explanation is that stocking rates have been low, typically 10 fingerlings per acre or less. Stocking rates for FLMB fingerlings from 2001 through 2003 ranged from 38 per acre to 62 per acre. Larger phase 2 bass have also been stocked each fall since 2001 at rates of 0.2 – 5.0 per acre. Genetics sampling is next scheduled for spring, 2013. Table 1 below characterizes the genetic composition of past largemouth bass sample results.

Table 1. Genetic composition (percent of sample size) of largemouth bass taken from Cheniere Lake, LA, by electrofishing, for 2002 – 2006.

LARGEMOUTH BASS GENETICS					
Year	Number	Northern	Florida	Hybrid	Total Florida Influence
2002	65	89%	2%	9%	11%
2004	92	94%	2%	4%	6%
2006	63	91%	0%	9%	9%

Crappie, Other sunfish species

From 1965 through 1994, biomass (rotenone) sampling was used to indicate status of crappie and sunfish populations in Cheniere Lake. Total weight of non-predatory game fish (sunfish) ranged from 10–20 pounds per acre. Crappie ranged from 3–6 pounds per acre. Sampling for crappie with 1.0 inch bar mesh lead nets was first conducted in fall, 2007. Although some crappie, along with other species, were captured, this gear was not considered efficient or reliable due to the difficulty of running it through the dense timber. The use of lead nets for sampling crappie and sunfish was therefore discontinued.

Commercial

Large rough fish species that normally comprise a commercial fishery are not found in this water body.

HABITAT EVALUATION

Aquatic Vegetation

Cheniere Brake has approximately 80% coverage of bald cypress (*Taxodium distichum*) and water tupelo (*Nyssa aquatica*). Submerged vegetation includes coontail (*Ceratophyllum demersum*), fanwort (*Cabomba caroliniana*), and bladderwort (*Utricularia spp.*), which are all typically abundant in the shallows. Water hyacinth (*Eichhornia crassipes* has been a problem in the past. In 1999, water hyacinth grew to heavy coverage on the north side of Cheniere Lake from Area 6 to Area 1 **(SEE APPENDIX I – AREA MAP)**. Spraying was initiated and current coverage is now insignificant.

Common salvinia (*Salvinia minima*) was first observed in small amounts in Fall 2007 and subsequently spread rapidly throughout the lake. Surface mats exceeding 100 acres were documented in various locations, mostly on the western half of the lake. Salvinia weevils (*Cyrtobagous salviniae*) were introduced into the lake in 2008 (see Biological Control in Cheniere Lake MP-A) in an effort to gain some control in the future if they become established. In February 2009, nearly 20% of the lake was covered with salvinia. In 2010 and 2011, salvinia was scarce on the lake, being found mostly in dense thickets in a creek near Area 8. By summer of 2012, salvinia coverage had once again expanded, with mats forming in various areas of the lake. Herbicide treatment has continued through the winter of 2012, with current coverage (March 2013) estimated at 25 acres. If the salvinia continues to expand, it will cause a detrimental impact to the habitat and fisheries, and inhibit recreational activities.

Chemical Treatment

Historically, only maintenance spraying of aquatic vegetation has been required on Cheniere Lake to keep nuisance species at a non-problematic level. Duckweed (*Lemna spp.*) and water hyacinth have required the most control, though alligator weed (*Alternanthera philoxeroides*), water primrose (*Ludwigia spp.*), and pennywort (*Hydrocotyle spp.*) have also been treated. Since 2009, more acres of common salvinia have been treated than all other species combined (Table 2). Duckweed and salvinia have typically been treated with diquat dibromide at a rate of 1.0 gals/acre. Water hyacinth is treated with 2,4-D (0.5 gals/acre) outside of the waiver period (March 15 – Sept. 15) and with glyphosate (0.75 gals/acre) when the waiver period is in effect.

Table 2. Acres of vegetation treated with herbicide on Cheniere Lake, 2008 – 2012.

	VEGETATION					
YEAR	Alligator weed	Common Salvinia	Duckweed	Pennywort	Primrose	Water Hyacinth
2008	-	8	-	-	-	8
2009	-	1,166	-	9	5	67
2010	-	190	563	-	-	7
2011	3	24	137	-	-	-
2012	-	302	95	2	-	11
TOTAL	**3**	**1,690**	**795**	**11**	**5**	**92**

Type Maps

No aquatic vegetation type maps have been performed.

Substrate

Natural water level fluctuations that controlled leaf litter build-up were altered with the impoundment of Cheniere Lake. When the spillway was constructed, water levels remained constant as opposed to the former regime that included high spring and low fall water levels. Leaves decomposed underwater at a far slower rate through the very slow anaerobic process. Eventually, shallow spawning areas were covered with a thick layer of organic muck. Sport fish populations eventually declined from lack of recruitment due to limited spawning substrate. The process was slow. So slow that it was difficult for many to recognize. However, the symptoms eventually prompted anglers to complain that Cheniere Lake "was just not as good as it used to be".

Since 1996, Cheniere Lake has been drawn down each year in the fall. The drawdowns are designed to emulate annual low water periods that occurred for many centuries. The annual low water was a necessary component to the swamp ecosystem that existed before the lake was impounded. A thick stand of cypress and tupelo produces many tons of leaves each year. In low water periods, the soaked leaves are exposed to air and decompose at a normal rate. Without exposure to air during the low water period, leaves decompose much slower and accumulate on the bottom of the lake.

Fortunately, the drawdowns are working very well. The layer of leaf litter in shallow areas is being reduced as indicated in Table 3 below. The most recent substrate samples were taken in 2011. Locations and observations are shown in **Appendix II**.

Table 3. Depth of organic material measured at various sample sites on Cheniere Lake, LA, 1997 – 2005.

Station	Coordinates	1997	1998	2004	2005
Area 1	32° 28'40.8" -92° 11'48.9"	40"	24"	30"	41"
Area 4	32° 27'31.2" -92 °12'10.6"	-	-	5"	6"
Area 5	32° 27'34.3" -92° 12'37.9"	12"	12"	14"	7"
Gary's	32° 27'39.9" -92° 12'45.9"	20"	18"	9"	18"
Area 6	32° 27'17.1" -92° 14'41.4"	6"		3"	3"
Area 7	32° 28'10.8" -92° 13'23.3"	30"	9"	4.5"	5"
Area 8	32° 29'09.8" -92° 13'17.8"	20"	9"	8"	5"
(SEE APPENDIX I – AREA MAP)					

The reduction in organic leaf litter along the perimeter of Cheniere Lake is providing increased spawning substrate to nesting fish. Unfortunately, due to the heavy tree coverage in Cheniere Lake, organic leaf litter will continue to be a concern indefinitely.

CONDITION IMBALANCE / PROBLEM

Cheniere Lake is typical of many impounded natural swamps in that eutrophication has been accelerated by an altered hydrological regime. Excessive organic material has accumulated on the lake bottom due to the disruption of natural water level regime when the former Cheniere Brake swamp was impounded to form Cheniere Lake. In a natural swamp, periods of low water in the late summer/early fall allow for decomposition of organic matter through the process of aerobic decomposition. Without exposure to air leaf litter and dead aquatic vegetation decompose under water through the much slower process of anaerobic decomposition. Throughout the life of the impoundment, the organic material has accumulated to such an extent that spawning substrate for nesting fish is covered. The resulting effect is a reduction in sportfish production.

CORRECTIVE ACTION NEEDED

Remove or reduce the organic material (leaf litter) currently found on the lake bottom to improve spawning substrate. Unfortunately, a quick solution to a problem that has developed over more than 50 years is an unrealistic expectation. The 3 foot drawdowns conducted each fall since 1998 have proven to be a beneficial management tool for Cheniere Lake. While beneficial effects have come slower than predicted from more extensive drawdowns, they have come with less risk of fish kills and inconvenience to lake users. The drawdowns imitate natural water level fluctuations that controlled the build-up of organic material of Cheniere Brake swamp before impoundment. A reduction in organic material on the lake bottom and a corresponding increase in sportfish production have been documented.

RECOMMENDATIONS

1. Continue Cheniere Lake water fluctuations with at least a 3-foot reduction in water level annually. Drawdown rate should be approximately 3-4 inches per day. Drawdowns should begin soon after Labor Day and extend to January 15th of the following year.

2. Duckweed and water hyacinth will be sprayed when mats of 0.25 acres or larger are observed or when they are impacting boat launches or cleared boat lanes. Control of emergent species will be conducted when coverage becomes problematic, though it is normally confined to the shoreline or very shallow coves. Salvinia will continue to be treated if coverage exceeds 10 total acres or surface mats have formed that are accessible by spray boat. In March 2013, LDWF adopted the following herbicide methods for control of both giant (*S. molesta*) and common salvinia:

   April 1 – Oct. 31: glyphosate (0.75 gals/acre)/diquat dibromide (0.25 gals/acre)/ Aquaking Plus surf. (0.25 gals/acre)/Thoroughbred surf. (8 oz. /acre)
   Nov. 1 – March 31: diquat dibromide (0.75 gals/acre)/appropriate surf. (0.25 gals/acre)

3. Continue introductions of Florida bass and evaluate stocking efficiency and survival as a function of fingerling stocking size, stocking rate and genetic strain. Employ most efficient stocking regime.

4. Continue existing recreational and commercial harvest regulations until LDWF sampling results indicate that change is appropriate and necessary from a biological perspective.

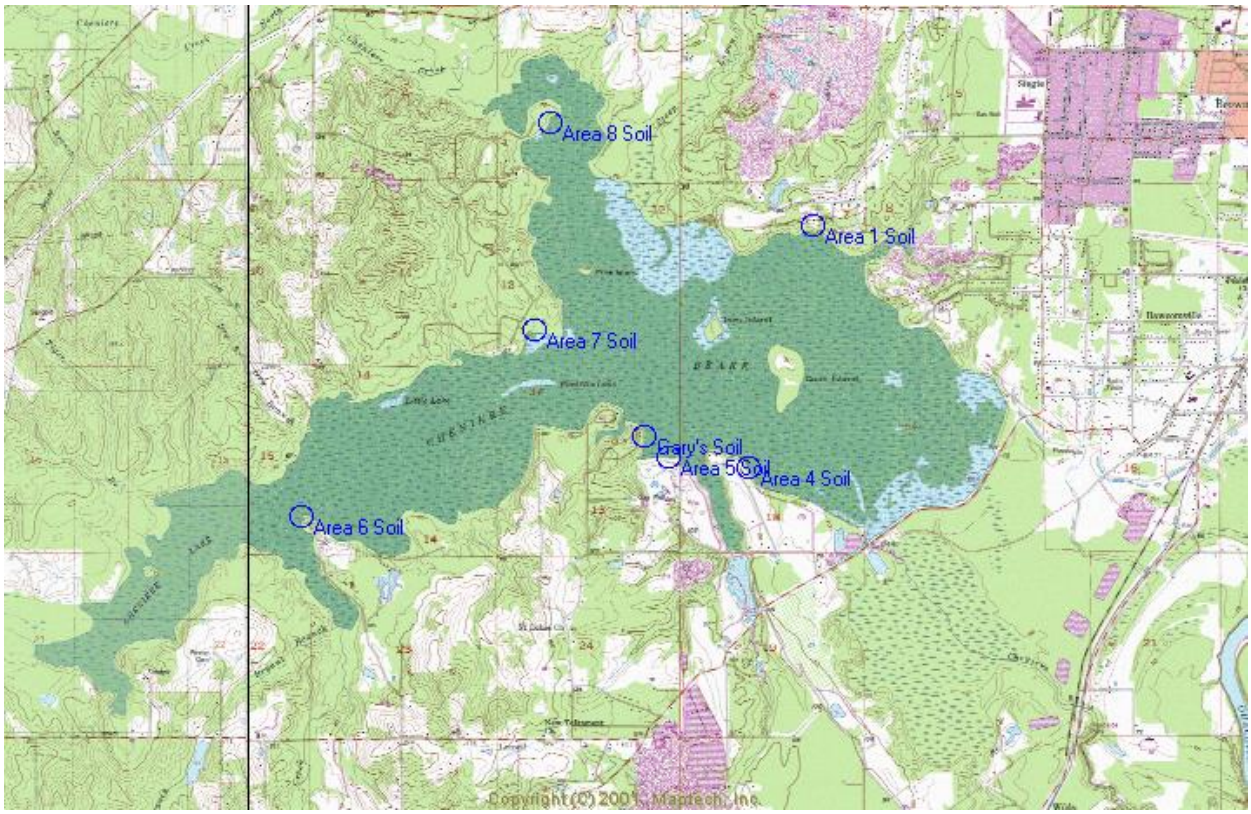
5. Continue scheduled standardized sampling of fish populations and aquatic vegetation to determine status over time.

6. Present updates on an annual basis to the Ouachita Parish Police Jury.

APPENDIX I

(return to Aquatic vegetation)

AREA MAP



APPENDIX II

(return to substrate)

Description of Substrate Samples, 2009 and 2011

Cheniere Substrate Samples – Feb 23, 2009

Note: likely those samples were not taken in exact original locations, PVC stake planted at these samples

Area 1: right side of right pier, 3rd piling
3594653.25 N
5713198.55 E
depth to sand/clay = 31"

Area 5: west of ramp, approximately 15 yds.
3591659.84 N
574258.60 E
depth to sand/clay = 9"

Area 6: 10 yds. NW of maple tree
3591082.83 N
571074.14 E
depth to sand/clay = 4"

Area 7: left of ramp, in natural opening, approximately 20 yds. from shoreline
3592773.67 N
573007.32 E
depth to sand/clay = 10"

Area 8: 15 yds. E (right) of ramp, 5 yds. N of sweet gum
3594652.71 N
573198.68 E
depth to sand/clay = 3"

Cheniere Substrate Samples – Dec. 1, 2011

Area 1: 3' in front of PVC marker (towards lake)
Depth to sandy clay 3", to grey sand = 9"

Area 5: approx. 15 yds. west of ramp
6" of organic over dark mud

Area 6: 10 yds. left of ramp, 2' from waters edge (drawdown)
Depth to grey clay = 3"

Area 7: left of ramp, in natural opening, approximately 20 yds. from shoreline
Depth to sand/clay = 9.5"

Area 8: approx. 15 yds. to right of ramp, 5 ft. up shoreline from waters edge (drawdown) along ditch bank
Depth to sand/clay = 2"